



Consumer and
Corporate Affairs Canada

Consommation
et Corporations Canada

(11) (A) No. 1 228 401

(45) ISSUED 871020

(52) CLASS 326-9

(51) INT. CL. ⁴A61N 1/32, A45D 44/22

(19) (CA) **CANADIAN PATENT** (12)

(54) Process and Apparatus for Treatment of Human Skin

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(21) APPLICATION No. 436,825

(22) FILED 830916

NO. OF CLAIMS 8

Canada

DISTRIBUTED BY THE PATENT OFFICE, OTTAWA.
CCA-274 (11-82)

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ABSTRACT

The invention relates to process of, and apparatus for treatment of human skin to reduce blemishes such as depressed scars, wrinkles, stria and similar skin irregularities which may be caused by aging. The process comprises applying a series of electrical impulses of low voltage and intensity to the skin to sequentially stimulate the endoblastic, mesoblastic and ectoblastic functions of the skin, and then to act on the dysmetabolic disorders of the skin. The frequency of each impulse is a harmonic of the preceding impulse and each impulse is applied for a predetermined and approximately equal length of time. The impulses are less than 0.25mA and less than 15 Volts.



This invention relates to a process and apparatus for treatment of human skin.

5 The human skin can be afflicted by blemishes such as wrinkles, stria, depressed scars and other similar irregularities which may be caused by aging.

10 Various proposals have been made in order to reduce or remove the aforesaid irregularities. For example, cosmetic creams have been proposed for the treatment of wrinkles, and whilst such creams prove useful in the hydration and nutrition of the skin, they do not have any specific action on wrinkles and similar irregularities.

15 Alternatively, the wrinkles, stria, depressed scars and other similar irregularities can be removed by surgery such as "lifting", or in the case of wrinkles by the injection of a suitable compound, such as silicone or collagene under the skin. Other treatments include the massage or grinding of the skin.

25 However, surgical treatment can be expensive, and sometimes painful especially where the surgical treatment requires removal of parts of the skin to reduce wrinkling. Although some of these treatments are effective in masking the blemishes, none of them actually improve the physiology of the dermis and epidermis. Furthermore, none of these treatments specifically treat 30 only the blemishes themselves.

It is an object of the present invention to provide a process and apparatus for reducing skin



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blemishes such as wrinkles, depressed scars and other similar irregularities which do not require the skin to be treated surgically, or by cosmetic substances.

5 It is a further object of the invention to provide a process and apparatus which does not require invasion of the human body below the inner surface of the skin, and which can be used by individuals without specialized training in the use of the process and
10 apparatus.

15 It has been discovered that the passage of a low intensity (less than 0.25 mA) direct current interrupted by rest periods of approximately 1 msec each, at a low frequency (less than 200 hertz) for short periods of time (less than 2 minutes) in the skin of humans has beneficial effects on the cellular metabolism of the skin. More particularly, it has been discovered that certain frequencies have more effect on particular
20 tissues comprising the skin. For example, a frequency of approximately 5 hertz acts more specifically of the endoblastic structures and the trophic function of the skin, a frequency of about 10 hertz acts on the mesoblastic function, a frequency of about 40 hertz on the ectoblastic function while a frequency of 80 hertz has more effet on dysmetabolic troubles. After a few
25 sessions, wrinkles tend to "fill up" as the result of a better physiology of the subcutaneous tissues.

30 In order that the above objects will become apparent, and so that the invention can be understood

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and carried into effect, apparatus for effecting the process of the invention will now be described with reference to the accompanying drawings, in which

5 Figure 1 is a block diagram of one form of apparatus in accordance with the invention; and

10 Figure 2 is a diagrammatic view of an alternative apparatus for carrying out the process of the invention.

15 Referring to Figure 1 of the drawings 10 indicates a positive electrode and 12 a negative electrode, each of which comprises a needle which resembles an acupuncture needle and is capable of being inserted in the skin of a human being.

20 The positive electrode 10 is connected to the positive terminal of a direct current generator (battery, transformer-rectifier, etc.) 14 by means of a conductive element 16, and connected in flow series between the generator 14 and the electrode 10 are an on-off switch 18, a resistance 20 and a potentiometer 22.

25 The negative electrode 12 is connected to the negative terminal of the generator 14 by means of a conductive element 24, which includes a contact breaker 26.

30 A frequency modulator 28 enclosed in box 44 is connected between element 16 and 24 to activate the contact breaker 26.

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The frequency modulator is constructed in a manner well known to those skilled in the art to provide direct current pulses separated by zero current periods of approximately 1 msec each at four predetermined frequencies for the electrical current passing there-through, namely frequencies of approximately 5, 10, 40 and 80 Hz in that order when the system is activated. In addition, the frequency modulator 28 also includes means whereby the duration of each frequency is predetermined, in this particular example, the duration is thirty seconds. Such means are well known to those skilled in the art.

In addition, the frequency modulator 28 is opened by an on-off button 30 also enclosed in box 44.

In order to provide an indication that electrical current is being supplied to the circuit an electrically conductive element 32 is connected between the elements 16 and 24, downstream of the switch 18, which element 32 includes a resistance 34 and a lamp 36, which in this example glows red when electrical current flows through the element 32 upon closing of the switch 18.

A further conductive element 38 is connected between the elements 16 and 24 downstream of the element 32, and like the element 32 includes a resistance 40 and lamp 42. Thus when the on-off button 30 is activated to close the circuit after closing of the switch 18, the lamp 42 will be connected to the negative terminal of

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the battery 14 via the modulator 28 and thus illuminated.

5 When the above described apparatus is to be used to treat wrinkles for example, the needles are slightly inserted (2 or 3 mm) into the skin at each end of the wrinkle to be treated.

10 Although needles are used in this example, they could be replaced by electrodes applied onto the skin at each end of the wrinkle to be treated after an appropriate electrolytic gel or solution has been coated onto the skin.

15 The electrical circuit is then activated by closing the switch 18 and the frequency modulator switch 30 is moved to the closed position.

20 Thus current will flow through the circuit, at four successive predetermined frequencies and for a predetermined time as previously described, and each frequency produces a particular reaction in the cellular metabolism of the skin.

25 The initial frequency of 5 Hz stimulates the endoblastic structure and trophic function of the skin, whilst a frequency of 10 Hz stimulates the mesoblastic function.

30 The subsequent application of 40 Hz activates an ectoblastic function and finally the application of the 80 Hz frequency acts on dysmetabolic disorders. Each

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frequency is applied for thirty seconds, and after the 80 Hz frequency, the frequency modulator automatically switches off at which point the lamp 42 is no longer illuminated, thus indicating that the electrodes are disconnected from the battery 14.

5

The above described process can be repeated, for example, at weekly intervals.

10

Whilst the electrical current is flowing through the electrodes, the person using the apparatus may experience a tingling or prickly sensation, but this can be reduced to an acceptable level by adjustment of the potentiometer.

15

Although in this example, the system has been designed in order that the maximum current be inferior to 0.25 mA, any other current which does not endanger the health of the user may be used.

20

Figure 2 of the drawings illustrate apparatus in accordance with the invention which includes two pairs of electrodes, each pair comprising a positive electrode 50 and a negative electrode 52. Each pair of electrodes is included in an electrical circuit, not shown which can be connected to a domestic electrical supply by means of an electrical lead 54.

25

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The electrical circuit includes a potentiometer 56 for each pair of electrodes, and a frequency regulator, whereby the 110 volts 60 Hz of a domestic supply can be varied so as to produce a 9 to 15 volt direct

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current output at the input of the modulator 28 electrodes together with a current cycle as described with reference to Figure 1 of the drawings.

5 In addition, the apparatus also includes an on-off button 58.

10 Thus the apparatus described with reference to Figure 2 of the drawings can be used in the manner described with reference to Figure 1 of the drawings, and in addition, the overall size of the apparatus is such as to render it portable.

15 While in the above description, frequencies of 5, 10, 40 and 80 hertz are specified, it should be understood that these are approximate frequencies and that the precise frequencies which provide the optimum results vary from one individual to another.

20 The optimum frequencies for a particular individual may be measured by constantly measuring the pulse rate of the individual while gradually increasing the frequency of the current applied to an area of the skin of the individual as described above. Each time the 25 pulse rate diminishes slightly, the frequency will correspond to an optimal frequency.

30 Tests carried out on a number of individuals have revealed that the average optimum frequencies of the group included 4.56, 9.125, 36.54 and 73 hertz respectively.

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Thus, the effectiveness of apparatus in which the frequencies have been preset will vary according to the extent of deviation of the preset frequencies from the optimum frequencies applicable to the individual using the apparatus.

10

Although the use of the method and of the apparatus was described to be for use in relation to wrinkles, it should be understood that this method and the apparatus are usefull for the treatment of any type of blemishes which are characterized by a certain reduction in the physiologic activity.

15

It will be seen therefore that the above described process enables selected areas of the skin to be treated without the necessity of surgery, cosmetics or the injection of silicone or similar substances.

20

In addition, the apparatus does not require the services of a skilled operator, and therefore, the apparatus can be used in the home.

REVENDICATIONS

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

- 1) A process for the treatment of human skin to reduce wrinkles, stria, depressed scars and similar blemishes comprising applying a series of electrical impulses of sufficiently low voltage and intensity so as not to injure the person being treated to the skin adjacent to the wrinkle, stria, depressed scar and similar blemishes, the frequency of each impulse being an harmonic of the preceding impulses, each impulse being applied for a predetermined time.
- 2) A process as claimed in claim 1, in which the impulses are selected to sequentially stimulate the endoblastic, mesoblastic and ectoblastic functions of the skin and then act on dysmetabolic disorders of the skin.
- 3) A process as claimed in claim 2, in which four impulses are applied to the skin.
- 4) A process as claimed in claim 3, in which the initial electrical impulse has a frequency of approximately 5 Hz; the second impulse has a frequency of approximately twice the first impulse; the third impulse has a frequency of approximately four times the second impulse and the final impulse has a frequency of approximately twice the third impulse.

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- 5) A process as claimed in claim 1, 3 or 4, in which the electrical impulses are of less than 0.25 mA at a voltage of less than 15 volts.
- 6) A process as claimed in claim 1, 3 or 4, in which the impulses are applied to the skin for approximately equal lengths of time.
- 7) Apparatus for carrying the process as claimed in claim 1, comprising positive and negative electrodes and means for connecting the electrodes to a source of direct current, the said connecting means including a voltage regulator and an electrical current modulator adapted to produce pulses of direct current interrupted by periods of zero or near zero current, in which the current modulator includes means for providing progressively increasing frequencies of the pulse to the electrodes.
- 8) Apparatus as claimed in claim 8, in which the current modulator includes means for providing at least four frequencies, each being an harmonic of the preceding frequency.

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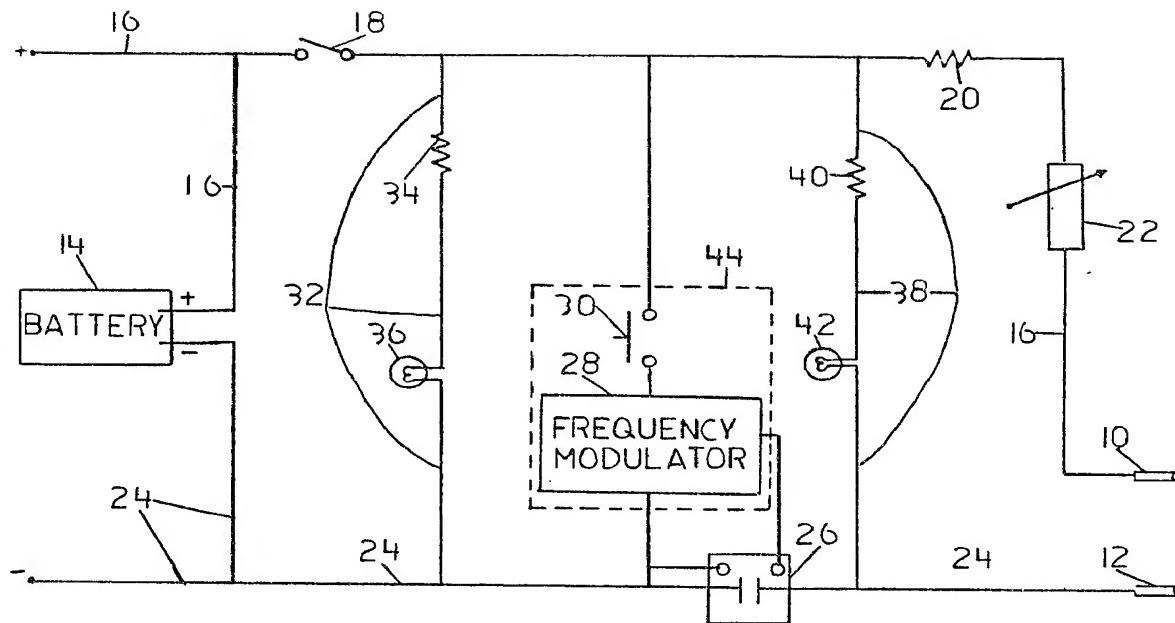


FIG. 1

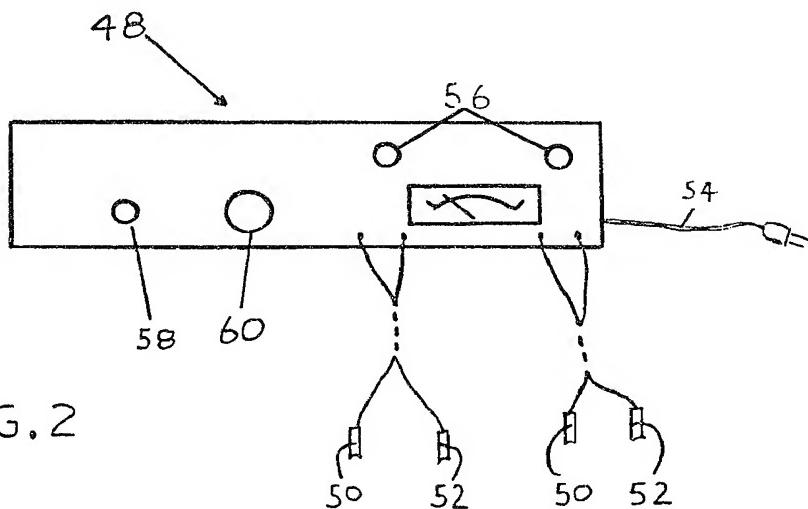


FIG. 2

CLAUDE BINARD
DOMINIQUE CARLE

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